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A Model of Errors and Irregularities as a General Framework for Risk-Based Audit Planning

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INTRODUCTION

Auditing standards define the objective of an audit as providing assurance that financial statements are presented fairly in accordance with generally accepted accounting principles (GAAP). Exactly how this should be achieved has been a subject of much interest in recent years. Now, because of SAS 58, the term "presented fairly" requires that the auditor must obtain reasonable assurance that the financial statements are free of material misstatements. This is in addition to the historical role of gathering positive evidence to support the assertion that the financial statements conform to GAAP, as applied on a consistent basis.¹

SAS 53, issued at the same time as SAS 58, provides some guidance with respect to the auditor's evaluation of whether the financial statements are free of material misstatements (hereafter called errors and irregularities). For example SAS 53, paragraph 6, states:

The auditor should assess the risks that errors and irregularities may cause financial statements to contain material misstatements. Based on that assessment, the auditor should design the audit to provide reasonable assurance of detecting errors and irregularities that are material to the financial statements. The auditor's assessment of the material misstatement of financial statements requires the auditor to understand the characteristics of errors and irregularities... Based on that understanding, the auditor develops and performs appropriate audit procedures and evaluates the results.

Of particular importance are the last two sentences which require the auditor to understand the "characteristics" of errors and irregularities, and based on that "understanding" to develop appropriate audit procedures.

In line with SAS 53, the purpose of our paper is facilitate the auditor's understanding of the characteristics of errors and irregularities. This is a necessary first step to fully implement the kind of risk-based auditing articulated in SASs 53 and 58. We do this by developing a model of financial statement errors and irregularities that can be used to assist in the process of risk-based audit planning.² The objective of the model, to echo SAS 53, is to better understand the "characteristics of errors and irregularities" with a goal of planning "appropriate audit procedures" in order for the auditor to have "reasonable assurance of detecting errors and irregularities."

¹ The scope paragraph of the standard audit report as required by SAS 58 makes this responsibility explicit.

² We do not claim that ours is the only analysis of errors and irregularities. For example Mautz and Sharaf (1961, Chapter 6) evaluate sources of financial statement misstatements and how the auditor may detect them.

There are several reasons for developing such a model. First, and most obvious, existing audit standards do not provide the kind of detailed guidance necessary to implement SAS 53 and SAS 58.³ Second, the academic research that has modeled errors and/or irregularities has been at an abstract level that cannot provide detailed guidance in the field.⁴ Third, field auditors appear to have rather limited personal experience in discovering errors and irregularities due to low occurrence rates [e.g., Kreutzfeldt and Wallace 1986, Loebbecke et al. 1989, Willingham and Wright, 1985]. This lack of experience hinders the development of both an underlying knowledge base as well as the cognitive structures required for organizing knowledge of misstatements into the "procedural knowledge" necessary for the development of problem solving expertise.⁵ Thus, besides providing a framework for assisting the auditor in audit planning, a model of errors and irregularities also provides more general benefits to auditors and students in learning, elaborating, and evaluating risk-based auditing.

The remainder of the paper is organized as follows. The next section defines the two basic elements of the model: (1) sources of errors and irregularities and (2) types of financial statement transactions. The model is then formally developed and presented in section three. The model shows how specific sources of errors/irregularities logically align with particular types of transactions. This leads to propositions about (1) the presence of specific sources of risk in particular components of the financial statements and (2) the risk-based audit planning implications. The analysis concludes by examining audit testing strategies in terms of the broad choice between internal control testing (and reliance) and substantive tests.

The model serves as a general framework for risk-based audit planning in the following manner. First it guides the auditor in identifying which particular populations of transactions/balances to test (in terms of the underlying risk of misstatements) and specifies the audit testing objectives (based on the nature of possible misstatements). Second it further guides the planning process by carefully delineating the roles of internal control testing and substantive testing for particular populations of transactions and account balances. In sum, with a model of errors and irregularities it is possible to plan and design appropriate audit tests in terms of *what* to audit and *why*, with respect to specific sources of errors and irregularities in the financial statements.

A preliminary caveat is in order with respect to the model. The model developed here is generic in the sense that it would be universally applicable to all engagements. However, it is not meant to be a complete, all-inclusive planning framework. The model would necessarily have to be supplemented by

³ Nor to the best of our knowledge have accounting firms developed anything comparable to the model of errors and irregularities we present in this paper. Readers are referred to disclosures by several of the major accounting firms of their proprietary auditing methodologies [e.g., Elliott (1983), Felix et al. (1990), Grobstein and Craig (1984), Leslie et al. (1986), Mullarkey (1984), Sullivan (1984), Walker and Pierce (1988)]. See also Kneer (1984) for a summary of the (then) Deloitte Haskins & Sells approach (which was also disseminated in the early 1980s at DH&S Auditscope seminars held around the country). In related work, Cushing and Loebbecke (1983) surveyed accounting firms' approaches to assessing audit risk.

⁴ Audit testing models have generally drawn on either Bayesian decision theory (Bailey 1981, Kinney 1975, Srivastava and Shafer 1992) or game theory (Fellingham and Newman 1985, Matsumura and Tucker 1992, Morton 1993). These models are not operational nor are they necessarily intended to be. Rather, they are fairly abstract and stylized models designed to elucidate and better understand salient features of the global audit testing process.

⁵ For general discussions of the cognitive development of auditor expertise see Bonner and Pennington (1991), Gibbins (1988), and Waller and Felix (1984). See also Ashton (1991) for an experimental study which underscores the critical role played by the auditor's knowledge of errors and irregularities in problem solving and the development of expertise, and the possible limits to expertise due to the auditor's limited experience with misstatements.

special engagement-specific audit risk concerns identified by the auditor. In addition, materiality decisions might either override or emphasize particular planning implications of the model. Finally, even though this study develops a formal model of errors and irregularities, the study is actually an example of applied auditing research and represents a response to recent calls for research into audit approaches (Akresh et al. 1988); for more realistic modeling in audit research (Solomon and Krogstad 1988, p. 10); for studying auditing in context and as a field of research in its own right (Johnson et al. 1989); and for greater relevance of academic research to the problems of accounting practice (Black et al. 1990).

DEFINITIONS OF ELEMENTS USED IN THE MODEL

The model of errors and irregularities that is developed in the next section is based on the interaction of two elements: (1) sources of misstatements in financial statements and (2) what the auditor audits, i.e., the types of transactions in financial statements. Specifically, the model analyzes interactions between three general sources of financial statement misstatements (random error, asset misappropriation, and financial statement manipulation) and two general types of financial statement transactions, completed and incomplete, with a further distinction between internally- and externally-generated transaction recognition.

Before defining these two elements of the model some brief observations on the relationship between transactions and financial statements are helpful. Auditors express an opinion on financial statements taken as a whole. However, financial statements are, by definition, the summarization of transaction recognition and valuation that has occurred in accounting journals. This means that the risk of a financial statement misstatement is really the risk that individual transactions have not been properly recognized and/or valued. Thus in auditing financial statements the auditor is ultimately expressing an opinion on whether or not the underlying transactions (that constitute the financial statements) are materially misstated. For this reason it is logical to model errors and irregularities in financial statements in terms of the underlying transactions that constitute the financial statements.

The two basic elements of the model are now discussed. First, sources of financial misstatements are presented based on definitions and categories in SAS 53. Then types of transactions are presented. This material is more complex and is a unique aspect of the study. It builds on two key ideas: (1) the notion of the completeness or incompleteness of transactions and (2) whether transaction recognition originates internally or externally.

Sources of Financial Statement Misstatements

Based on definitions in SAS 53, material misstatements may occur from either (1) *errors* which are "unintentional" in origin or (2) *irregularities* which are "intentional" misstatements (see paragraphs 2-3 of SAS 53). Errors occur from mistakes in underlying data, from incorrect accounting estimates, and from mistakes in applying generally accepted accounting principles. Hereafter, errors will be referred to as *random errors* to delineate them from irregularities and to emphasize the underlying risk (i.e., randomness). By contrast, irregularities are intentional in origin. SAS 53 further subdivides irregularities into (a) the misappropriation of assets and concealment in accounting records (also called defalcations), (b) outright theft of assets (misappropriation *without* concealment in accounting records) and (c) fraudulent manipulation of the financial statements (also called management fraud). No further consideration is given in this paper to item (b), outright asset theft, because the auditee's physical controls over assets and other asset accountability procedures (e.g., bank reconciliations, physical inventories) are assumed to normally prevent or detect such theft.⁶

⁶ Even if these internal controls are not adequate, the audit tests suggested by the model should also detect outright asset theft (see audit planning implications P4 and P6).

Types of Transactions: Completed and Incomplete, and Internal Versus External

For simplicity we initially characterize accounting transactions as originating from a bilateral economic exchange between the auditee and another party. While this represents the majority of accounting transactions, we later relax this definition to deal with what we term unilateral or internally-generated recognition by an auditee. An economic exchange can be temporally classified as initially *incomplete* and then being subsequently *completed*. The exchange remains incomplete until all of the underlying economic activity required by the auditee and the other party to the exchange is fully completed by *both* parties. For example, a credit sale is initially "incomplete" and remains so until payment is received from the debtor. At this later date the credit sale, which was originally incomplete, becomes completed.⁷ Similarly, a credit purchase is initially incomplete and then becomes "completed" when cash is disbursed or the account payable is otherwise debited (e.g., purchase returns).

Some exchanges are more complex, such as sales with right of return or with warranties. Nevertheless, they can be classified as completed or incomplete by decomposing the exchanges into their constituent components. For example, a sale with warranty can be analyzed as having a conventional sale component which is completed when cash is received and a warranty component which remains incomplete (warranty liability) until the warranty period expires.

The completion of purchases is also more complex than suggested above. For purchases a distinction must be made between the acquisition of goods and services and their subsequent use if the use extends beyond the current fiscal year.⁸ For example, the acquisition of inventory is completed when payment is made to vendors. However, the inventory account balance represents incomplete use of the inventory by the auditee. Inventory becomes used or completed when the goods are subsequently sold to customers (i.e., the completion of an economic exchange of inventory between the auditee and customer).⁹ Similarly, the purchase of fixed assets is completed when cash is disbursed to vendors, whereas the use of fixed assets is economically completed when the assets are retired and written off (i.e., fully used up in production for the generation of revenues).¹⁰

Completed and Incomplete Transactions. The preceding discussion about completed and incomplete economic exchanges is mirrored in the accounting transactions that are recognized in the financial

⁷ A credit sale may be completed other than by cash collection: (1) if the account receivable is written off as uncollectible or (2) if a contra-sale occurs, i.e., sales return or sales discount. The point here is that all of these are mechanisms through which the account receivable is credited, and the outstanding debit amount removed (completed) from the account balance.

⁸ Purchase transactions that represent periodic operating expenses (i.e., selling, general, and administrative expenses) are "completed" when cash is paid. Since these transactions are periodic expenses it is not necessary to make a distinction between acquisition and use, that is, acquisition and use take place in the same accounting period except for year-end accruals.

⁹ Since the manufacturing of goods and the placing of them in finished goods inventory only leads to internal accounting transfers, the acquisition of inventory (and its conversion to finished goods) is completed when the final product is sold to an external party. The intermediate accounting consists only of internal cost transfers from one inventory account to another.

¹⁰ It can be argued that partial completion occurs each year through periodic recognition of depreciation expense. However, as will be seen it is more useful to define completion as total (100%) completion. This means that a fixed asset remains incomplete until retirement, and depreciation expense is a periodic valuation adjustment to the asset.

statements. This is the basis for the two kinds of accounting transactions in the model. *Incomplete accounting transactions* represent those economic exchanges that remain incomplete at the end of the fiscal period. *Completed accounting transactions*, by contrast, represent those economic exchanges that have been completed during a fiscal period. Thus economic exchanges lead to two distinct types of accounting transactions: (1) the initial recognition of an incomplete exchange (e.g., credit sale) and (2) the subsequent recognition of the completion of the exchange (e.g., cash receipt).

Internal Versus External Recognition. A further distinction is made between (1) transaction recognition originating in direct response to a bilateral exchange with an external party, i.e., externally-generated recognition and (2) transaction recognition that unilaterally results from the auditee's own internal accounting procedures, i.e., internally-generated recognition. The majority of accounting transactions (both completed and incomplete) are external and the preceding examples implicitly assumed this to be the case. For example, credit sales and credit purchases, and the subsequent cash receipts and disbursements are recognized in direct response to billings, and to subsequent cash outflows or inflows with the other party to the economic exchange. These kinds of externally-generated bilateral transactions are normally supported by source documents to/from external parties, have a visible audit trail, are high volume in nature, and are recorded in specialized accounting journals such as sales, purchases, payroll, cash receipts and cash disbursements.

While the majority of transactions are external in the sense described above there are also a number of important internally-generated transactions. Internally-generated recognition of *completed transactions* pertain to asset write-offs. Specific examples of asset write-offs include: asset retirements (internal completion of fixed assets), write-offs of accounts receivable as bad debts (internal completion of sales), and write-offs of other assets whose value is totally impaired (internal completion of other assets). In all of these cases, the auditee unilaterally completes the underlying economic exchange through the action of writing off the asset as having completed its economic value to the firm. These transactions are low volume in nature and would normally be recorded in the general journal.

Internally-generated recognition of *incomplete transactions* include routine year-end accruals and adjusting entries, the recognition of self-constructed assets, and internal inventory transfers from raw material to work-in-process to finished goods.¹¹ Another common type of internally-generated *incomplete transaction* is the end-of-period asset valuation adjustment. Examples include valuation adjustments to accounts receivable for doubtful accounts, to inventories for cost of goods sold and asset write-downs (i.e., lower-of-cost-or-market), to prepaid expenses for periodic amortization, to investments for investment loss write-downs, and to fixed assets for periodic depreciation expense or for asset impairments. Again, because these transactions are low volume in nature they would normally be recorded in the general journal.

Table 1 summarizes examples of the four types of transactions that have been discussed throughout this section, classifying the transactions into the completed and incomplete categories, and further subdividing them into internally- and externally-generated recognition. As will be illustrated in the next section of the paper, the usefulness of these transaction categories lies in how they logically map to particular sources of misstatements and hence lead to an identification of *where* the auditor should audit (i.e., which accounting population) and for *what* type of risk (i.e., source of misstatement).

¹¹ While recognition is internally-generated by the auditee's own accounting procedures (rather than a direct response to an external party to the exchange), the original notion of an economic exchange being incomplete or completed still holds. For example, year-end accruals are "completed" when cash is received or disbursed in the next period, self-constructed assets are "completed" when fully depreciated and retired, and inventories are "completed" when finished goods are ultimately sold to external parties.

Table 1
Examples of the Transaction Types

Transactions Representing a Completed Transaction		Transactions Representing an Incomplete Transaction*	
Examples of Internally Completed Transactions:	Examples of Externally Completed Transactions:	Examples of Internally Incomplete Transactions:	Examples of Externally Incomplete Transactions:
Asset Write-offs: Asset Retirements Bad Debt Write-offs Other Asset Write-offs	Cash Receipts from Sales Cash Disbursements Sales Returns & Allowances	Year-end Accruals and Adjusting Entries Year-end Asset Valuation: Ending Inventory Amortization of Prepayments Receivables Allowance Depreciation Investment Write-downs Other Asset Impairments	Sales on Credit Purchases on Credit Prepayments

* Transactions that are initially incomplete become subsequently completed by either by an "internal" or "external" completed transaction.

A MODEL OF ERRORS AND IRREGULARITIES

The model which is developed in this section formulates a systematic relation between type of transaction and source of misstatement. Table 2 summarizes these results as (1) risk propositions and (2) preliminary audit planning corollaries and testing implications. Each risk proposition is for a specific category or population of transactions and is derived from an analysis of the interaction between (1) the presence or absence of specific sources of errors and irregularities (random error, asset misappropriation, or financial statement manipulation) and (2) a specific category of transactions (completed or incomplete). Each proposition leads to one or more corollaries with respect to preliminary audit planning implications. These planning implications focus on the resulting need (or lack of need) for audit testing.

As seen from Table 2, the model's predictions about the risk of errors and irregularities and the resulting audit planning implications can be summarized by the following duality. First, because there is very little risk of either random error or financial statement manipulation in completed transactions, *completed transactions* normally need only be tested for risk of asset misappropriation. Second, because there is a risk of both random error and financial statement manipulation (but no risk of asset misappropriation), *incomplete transactions* normally need to be jointly tested for random error and financial statement manipulation.

Thus the model provides a framework for preliminary audit planning based on the specific populations of transactions that are (or are not) normally in need of testing for specific sources of misstatement. In keeping with the generalized nature of the planning framework, the model does not initially specify how the actual audit testing would be done, e.g., control versus substantive tests, or specific types of substantive tests (e.g., analytical procedures versus tests of details). However, these broader questions of audit testing strategy are reconsidered later in the paper.

The model is now formally developed beginning with an analysis of completed transactions and each of the three sources of misstatements. The same analysis is then undertaken for incomplete transactions.

Analysis of Completed Transactions

Risk of Random Errors in Completed Transactions. Random errors in completed transactions can occur if transactions are initially recognized and then subsequently completed at an erroneously over- or understated monetary amount. However, the probability of this is very low. Completed transactions are normally subjected to the joint effects of the internal control systems of the two parties to the transaction (e.g., the firm and its customers or vendors, or employees in the case of payroll). That is, the two internal control systems provide independent checks on the transaction processing and are likely to prevent such errors from occurring in the first place, or to correct such errors before the transaction is completed.¹²

By contrast, completed transactions resulting from internally-generated recognition (see Table 1) do not receive the scrutiny of these two internal control systems and consequently random errors could go undetected. However, as will be discussed below, internally-completed transactions are directly tested for misstatement from asset misappropriation (fraudulent asset write-offs) and hence are subjected to audit testing albeit for a different audit objective. Thus because they are subject to testing for asset

¹² If by chance random errors go undetected by both parties' internal control systems, it is not clear that the monetary amount of errors in these completed transactions are recoverable or that the financial statements need correcting. It can be argued that *caveat emptor* applies and that there is no financial statement error, per se, if these transactions have been voluntarily completed by both parties to the transaction.

Table 2
Risk Propositions (R) and Audit Planning Corollaries (P)

Source of Misstatement	Completed Transactions	Incomplete Transactions
Random Error	R1: There is little risk of financial statement misstatement from random error in completed transactions.	R4: There is a risk of financial statement misstatement from random error in <i>all</i> incomplete transactions, but especially in internally-generated transactions.
	P1: Because of the low risk there is no compelling reason to plan audit tests of completed transactions for risk of random error.	P4: There are compelling reasons to test <i>all</i> incomplete transactions (and especially internally-generated transactions) for misstatement from random error.
Asset Misappropriation	R2: There is a risk of financial statement misstatement from asset misappropriation in certain populations of completed transactions.	R5: There is no risk of financial statement misstatement from asset misappropriation in incomplete transactions.
	P2a: Noncash completion of sales, and cash disbursements, should both be tested for the risk of <i>cash</i> misappropriation and concealment.	P5: There is no logical reason to plan audit tests of incomplete transactions for the risk of misstatement from asset misappropriation.
	P2b: Internally-generated asset write-offs should be tested for the risk of <i>noncash</i> asset misappropriation and concealment.	
Financial Statement Manipulation	R3: There is little risk of financial statement misstatement from financial statement manipulation in completed transactions, assuming routine tests of ending cash balances are performed.	R6: There is a risk of financial statement misstatement from financial statement manipulation in <i>all</i> incomplete transactions (and especially internally-generated transaction recognition).
	P3: Because of the low risk there is no compelling reason to plan audit tests of completed transactions for the risk of financial statement manipulation, beyond routine tests of ending cash balances.	P6: There are compelling reasons to test <i>all</i> incomplete transactions (and especially internally-generated ones) for the risk of financial statement manipulation.

misappropriation, special audit tests are not necessary for random error in internally-generated completed transactions.

In sum, random errors in externally-generated completed transactions are unlikely. While this is not the case for internally-generated completed transactions, they are directly tested elsewhere (see planning implication P2b below) and thus do not need to be specially tested for random error. Consequently, given the low risk there normally is no reason to test completed transactions, either internally- or externally-generated, for random error.¹³ Formally stated the risk proposition (R1) and preliminary audit planning implication (P1) are:

R1: There is little risk of financial statement misstatement from random error in completed transactions.

P1: Because of the low risk there is no compelling reason to plan audit tests of completed transactions for risk of random error.

Risk of Asset Misappropriation in Completed Transactions. Two types of assets may be misappropriated (and concealed): cash and noncash assets. Cash misappropriation is examined first.

Misappropriation (and concealment) of cash means that transactions have been "fraudulently completed" to conceal the misappropriation. The model provides a basis for analyzing which particular completed transactions are at risk of being fraudulently completed in order to conceal cash misappropriation. Cash misappropriation could occur in either of two ways: (1) through underreporting of cash receipts from credit sales (fraudulent completion of sales)¹⁴ or (2) through unauthorized disbursement of cash (fraudulent completion of purchases or other disbursements). In either case there is an understatement of the "true" or non-fraudulent cash balance, and a corresponding understatement of net income as a result of the fraudulent completion of the transaction. Each of these is now discussed.

First, consider the fraudulent completion of sales. Misappropriation of cash receipts from credit sales can be concealed by fraudulently "completing" sales in a noncash manner. This can occur through actions such as bogus sales returns or bogus cash discounts, or through the fraudulent write-off of an account as uncollectible. The implication is that *noncash* completions of credit sales are at risk and warrant testing.

Second, consider fraudulent cash disbursements for purchases. Fraudulent cash disbursements can occur through bogus vendor invoices, or from fraudulently overstated dollar amounts on otherwise valid purchases. The same is true of cash disbursements for payroll and other disbursements in general.

¹³ A random error in completed transactions that could potentially occur and go uncorrected in accounting systems is the misclassification of transactions (including the misapplication of GAAP to transactions). If misclassification errors exist, and are material, preliminary analytical review may indicate their presence through the identification of unusual fluctuations in account balances. Also, to the extent certain populations of completed transactions are tested for asset misappropriation (see P2a and P2b in the next section) there is a joint test for random error due to misclassification. In particular P2a specifies the testing of cash disbursements which is where misclassification errors may be most likely to occur (i.e., a misclassification of expenditures such as capitalizing rather than expensing or vice-versa). Misclassification errors could also exist in incomplete transactions. However, the testing identified in audit planning corollaries P4 and P6 would fully test for this.

¹⁴ If cash is taken before sales are recorded then this is outright theft rather than misappropriation and concealment in the accounting records. The omitted recording of sales is more difficult to audit (the completeness assertion) and the auditor normally relies on tests of the client's internal control system and on analytical procedures.

For example, fraudulent disbursement can occur from payroll ghosting (fictitious employees) or from the overstatement of hours and/or pay rates on an otherwise valid payroll payee. The overall implication is that all cash disbursements are at risk and warrant testing.

Noncash asset misappropriation and concealment is now examined for several types of noncash assets (accounts receivable was treated as "cash" and evaluated above). First, the theft marketable securities can be concealed through a fraudulent asset write-off for impaired value. Second, the misappropriation of inventory can occur through a fraudulent completion related to improper inventory write-offs for asset impairments. Third, the misappropriation of long-term or fixed assets can be concealed through bogus retirement or write-off of the misappropriated assets. In each of these cases, the misappropriation of noncash assets is concealed through an internally-generated fraudulent completion. Such asset write-offs are visible, are normally recorded in the general journal, and should be tested to determine the transaction's validity.

In sum, there is a risk of asset misappropriation in completed transactions. Formally stated the risk proposition (R2) and preliminary audit planning implications (P2a and P2b) are:

R2: There is a risk of financial statement misstatement from asset misappropriation in certain populations of completed transactions.

P2a: Noncash completion of sales, and cash disbursements, should both be tested for the risk of *cash* misappropriation and concealment.

P2b: Internally-generated asset write-offs should be tested for the risk of *noncash* asset misappropriation and concealment.

Risk of Financial Statement Manipulation in Completed Transactions. The fraudulent manipulation of financial statements in completed transactions is highly unlikely. Such manipulations would be readily detected through routine testing for discrepancies in the ending cash balance.¹⁵ Consequently, special audit procedures (beyond tests of cash) are normally not required to test for financial statement manipulation in completed transactions.

Formally stated the risk proposition (R3) and preliminary audit planning implication (P3) are:

R3: There is little risk of financial statement misstatement from financial statement manipulation in completed transactions, assuming routine tests of ending cash balances are performed.

P3: Because of the low risk there is no compelling reason to plan audit tests of completed transactions for the risk of financial statement manipulation, beyond routine tests of ending cash balances.

¹⁵ To illustrate, if "completed" sales are overstated by bogus (fraudulent) transactions then the cash account, because of double-entry accounting, must show a corresponding increase (since the transaction is completed) and must also be overstated. This fraudulent overstatement of cash would be detected through the auditor's routine test of the ending cash balance (e.g., bank confirmation and cutoff statement to test the year-end bank reconciliation). Similarly, if recorded "completed" purchases are understated (relative to actual cash disbursements) in order to fraudulently overstate income, then the ending balance of cash would show a discrepancy between cash per bank and cash per books.

Analysis of Incomplete Transactions

Sources of risk in incomplete transactions are now analyzed. Random errors are evaluated first followed by an analysis of asset misappropriation and financial statement manipulation.

Risk of Random Errors in Incomplete Transactions. For completed transactions it was argued that random errors are unlikely to occur (see R1 and P1). In contrast, for incomplete transactions such errors could exist because the transactions have not yet been fully screened by both parties' internal control systems. By virtue of being incomplete, these random errors can be corrected and the transaction can be subsequently completed at the corrected amount. The detection of these random errors would result in an adjustment to the financial statements (if material). Random error could exist in any population of incomplete transactions (see Table 1). However, there is a special risk of random errors with internally-generated recognition such as year-end accruals because such transactions do not go through the same kind of rigorous internal control system as is used for routine, repetitive, high-volume, externally-generated transactions.

In sum, there is risk of random error in all populations of incomplete transactions. Formally stated the risk proposition (R4) and preliminary planning implication (P4) are:

R4: There is a risk of financial statement misstatement from random error in *all* incomplete transactions, and especially in internally-generated transaction recognition.

P4: There are compelling reasons to test *all* incomplete transactions (and especially internally-generated transactions) for misstatement from random error.

Risk of Asset Misappropriation in Incomplete Transactions. Recall that the concealment of misappropriated assets can only occur in completed transactions (see R2, P2a and P2b). By definition, then, there is no risk of asset misappropriation (and concealment) in incomplete transactions and hence no logical reason to test for such risk.¹⁶ Formally stated the risk proposition (R5) and preliminary audit planning implication (P5) are:

R5: There is no risk of financial statement misstatement from asset misappropriation in incomplete transactions.

P5: There is no logical reason to plan audit tests of incomplete transactions for the risk of misstatement from asset misappropriation.

Risk of Financial Statement Manipulation in Incomplete Transactions. The fraudulent misstatement of assets and income can be concealed, at least temporarily, in incomplete transactions such as accounts receivable or inventory. More subtle manipulation could also occur through end-of-period valuation adjustments to asset accounts, for example, the deliberate underestimation of the allowance for uncollectible accounts receivable. Internally-generated transactions involving year-end accruals and adjustments, and end-of-period asset valuation adjustments are particularly vulnerable because they are not subject to the same kind of internal control systems that apply to routine, high-volume, externally-generated transactions.

¹⁶ Outright theft of assets (i.e., unconcealed asset misappropriation) will by definition occur in incomplete transactions. However, as discussed in footnote 6 such thefts should either be detectable by the auditee's internal control system, or, failing that, by the auditor's tests of incomplete transactions for random errors or financial statement manipulation. Therefore, no special audit tests beyond those suggested by P4 above (and P6 below) are necessary.

Thus there are compelling reasons to test all types of incomplete transactions for financial statement manipulation. Formally stated the risk proposition (R6) and preliminary audit planning implication (P6) are:

R6: There is a risk of financial statement misstatement from financial statement manipulation in *all* incomplete transactions (and especially internally-generated transaction recognition).

P6: There are compelling reasons to test *all* incomplete transactions (and especially internally-generated ones) for the risk of misstatement from financial statement manipulation.

RELATION OF THE MODEL TO SAS 31 ASSERTIONS

Further insights can be gained by considering the model in terms of the SAS 31 assertions (existence, completeness, rights and obligations, valuation, presentation). These assertions can be thought of as the "properties" that make the financial statements presented fairly. In and of themselves, however, the assertions are not particularly instructive for audit planning. They do not specifically identify what should be audited, or why, from a risk perspective.

The assertions are, however, very useful for clarifying the scope of audit testing objectives once an area for testing has been identified through risk-based audit planning. Our model of error and irregularities provides this by analyzing which populations of transaction are at risk and should be tested. The model's risk propositions R1-R3 and preliminary planning implications P1-P3 can then be related to SAS 31 assertions in the following specific manner:

1. for the risk of asset misappropriation in *completed transactions* (R2), the primary assertion being tested (P2a and P2b) is existence or the validity of transactions that could conceal asset misappropriations (or relatedly the validity of the underlying control system that generates the transactions).
2. for the risk of random error and/or financial statement manipulation (R4 and R6) in *externally-generated incomplete transactions*, the primary assertions being tested (P4 and P6) are the existence and completeness of incomplete transactions with respect to proper year-end recognition and cutoff.
3. for the risk of random error and/or financial statement manipulation (R4 and R6) in *internally-generated incomplete transactions*, the primary assertions being tested (P4 and P6) are (a) existence, completeness and valuation of year-end accruals and adjusting entries and (b) the proper valuation of assets (i.e., end-of-period asset valuation adjustments).

In sum, the model's preliminary audit planning implications (P2a, P2b, P4, and P6), clarify and provide guidance as to which assertions (i.e., "properties" of correctness) are relevant to which class of transactions.¹⁷

¹⁷ We have not discussed the "disclosure" and "rights and obligations" assertions. In our view, the "rights and obligations" assertion can be interpreted as an elaboration of the existence and completeness assertions. That is, asset recognition has validity only if rights to the asset actually exist (existence). Similarly, liability recognition is complete only if all obligations are recognized that should be recognized (completeness). Therefore we do not treat it as a separate assertion with additional testing requirements.

AUDIT STRATEGIES FOR CONTROL AND SUBSTANTIVE TESTS

The audit planning corollaries (P1-P6) of the model are quite specific and can be used as a general guide to preliminary audit planning. In particular, planning corollaries P2(a,b), P4 and P6 identify those specific populations of accounting transactions or account balances where some form of testing is normally appropriate, and P1, P3 and P5 identify situations where testing is not normally warranted. We now show that these results also lead to a systematic framework for assisting auditors in their strategic choice of (1) internal control system compliance tests or (2) substantive tests of transactions and account balances.¹⁸ Thus our model of errors and irregularities also provides a preliminary planning framework for identifying where control versus substantive testing is normally appropriate. As noted before, though, exactly how control and substantive testing is carried out (e.g., analytical procedures versus tests of details) is beyond the scope of the study's analysis.

The analysis in this section uses the transaction categories developed for the model of errors and irregularities: completed-incomplete and internal-external. With these characterizations it is easy to assess the use of control versus substantive tests for the accounting populations specified by planning corollaries P2(a,b), P4 and P6. The analysis proceeds as follows. Completed transactions are analyzed first with a further distinction between internal and external. Incomplete transactions are then analyzed, again with a further distinction between internal and external. Results of the analysis are summarized in Table 3.

Completed Transactions (Planning Corollary P2(a,b): Asset Misappropriation and Concealment)

The model of errors and irregularities in Table 2 identifies specific populations of completed transactions that can be used to conceal asset misappropriation (see audit planning corollaries P2a and P2b). Two testing approaches are possible for these completed populations. In the first approach the auditor could test the underlying internal control system to determine that proper authorization procedures exist to assure the validity of these completed transactions. Alternatively, since the model identifies specific transactions in which concealment is possible, direct substantive tests of these transactions could be performed to determine the validity of the transactions and that they have not been used to conceal asset misappropriations.¹⁹ It will now be shown that this trade-off between control and substantive testing for asset misappropriation in completed transactions normally hinges on the internal versus external nature of transaction completion.

¹⁸ Audit standards clearly demarcate these two categories of tests, for example, SAS 47 and SAS 55. In addition, the audit risk model establishes an inverse relationship between reliance on controls and reliance on evidence from substantive tests.

¹⁹ By contrast control system tests are only *indirect* tests of underlying transactions based on an assessment of the quality of the control system. As discussed in SAS 47 good (bad) control systems are presumed to be correlated with a lower (higher) likelihood of material financial statement misstatements. Nevertheless, empirical studies have generally failed to support the proposition that good internal control systems lead to fewer financial statement misstatements (e.g., see Kreutzfeldt and Wallace 1990, Waller 1993, Willingham and Wright 1985). The reason for this may be that internal control systems are effective in controlling transaction-level processing of routine, high volume, externally-generated transactions, whereas misstatements (random and nonrandom) are more likely to occur in lower volume, internally-generated transactions that do not lend themselves to the same degree of process control. Thus one could observe strong internal controls over routine transactions, but if misstatements are primarily in internally-generated transactions (as the data by Kreutzfeldt and Wallace 1986 suggest) then there would be no correlation between the control system and the incidence of misstatements.

Table 3
Implications for Control Versus Substantive Tests

Transaction Type	Model's Control Tests	Substantive Tests	Planning Corollaries	Audit Concerns
<u>Completed:</u>			P2(a,b)	Misappropriation & Concealment
Internal	No	Yes		
External	Yes -Trade-offs-	Yes		
<u>Incomplete:</u>			P4, P6	Random Error & Financial Statement Manipulation
Internal	No	Yes		
External	Yes -Trade-offs-	Yes		

Internally-Recognized Completed Transactions.

Asset misappropriations in completed transactions can occur through certain internally-generated and low-volume transactions that are recorded in the general journal such as the noncash completion of sales through bad debt write-offs or through other asset write-offs. These types of transactions do not lend themselves to the same degree of internal processing controls as do externally-generated high-volume transactions. For this reason it normally would be more appropriate for the auditor to rely on direct substantive tests of these transactions. In other words it would not be necessary to perform control tests relating to these particular populations of transactions since they can be directly tested through substantive tests.

Externally-Recognized Completed Transactions. Control tests (and hence internal control reliance) for asset misappropriation in completed transactions may be efficient and effective for populations of externally completed transactions. These completions are typically high volume in nature and are recorded in special journals. For example, high-volume externally completed purchase transactions (see testing corollary P2a) might be efficiently and effectively audited via control tests (rather than direct substantive transaction tests). The same may also be true of the external completion of sales through high-volume returns and allowances.

Finally, it is possible that the optimal audit strategy would be a mix of control tests and substantive tests of transactions. However, the nature of these trade-offs is beyond the scope of this study.²⁰

²⁰ There has been some prior research on combining evidence from control tests and substantive tests (e.g., Bailey 1981, Grimlund 1982, Kinney 1975, Smieliauskas 1985), but little formal modelling of the trade-offs in deriving an optimal audit strategy. Our approach to this question identifies where control tests logically make sense and where they do not. Only where control tests are logical is there a need for further analysis of what the optimal trade-off is regarding the amount of evidence from control tests and substantive tests, and the development of algorithms for combining such evidence.

Incomplete Transactions (Planning Corollaries P4 and P6: Misstatements from Random Error & Financial Statement Manipulation)

The model of errors and irregularities (summarized in Table 2) has two auditing planning corollaries with respect to incomplete transactions, P4 concerning the risk of random errors and P6 concerning the risk of financial statement manipulation. The analysis again shows that the choice of control versus substantive test hinges on whether the recognition is internally or externally generated.

Internally-Recognized Incomplete Transactions. Internally-generated incomplete transactions are year-end accruals and adjusting entries, self-constructed assets, internal inventory transfers, and end-of-period asset valuation adjustments. With the possible exception of inventory transfers, these are normally low-volume transactions that are recorded in the general journal. These transactions are not therefore effectively controlled by processing-oriented transaction-level control systems.

By definition, then, internal transactions are judgmental items, non-routine (low volume) in nature, and recorded in the general journal rather than high-volume special journals. As a result, internal control system reliability (control risk) is unlikely to be an effective audit approach. Instead, audit testing must necessarily rely on (1) substantive tests of transactions (in the case of year-end accruals and adjusting entries) and (2) substantive tests of asset balances (in the case of self-constructed assets, internal inventory transfers, and end-of-period asset valuation adjustments).

Externally-Recognized Incomplete Transactions. The primary source of misstatement in externally-generated incomplete transactions is improper recognition and cutoff at year end. The particular risks are:

1. the "existence" assertion, or whether the assets/revenues that were recognized should have been recognized.
2. the "completeness" assertion, or whether all liabilities/expenses that should have been recognized were in fact recognized.

These types of transactions are normally recorded in high-volume special journals and may be effectively controlled by well-defined processing-level transaction control systems identified by the auditor's preliminary review of controls. In such cases, control system reliance and testing may be efficient and effective in evaluating the likelihood of either random errors or financial statement manipulation.

Thus there is a potentially strong role for control testing with a resultant cutback in substantive testing in these externally-recognized incomplete transactions. Again, though, the optimal strategy may be a mix of both control and substantive tests and the precise nature of these trade-offs is beyond the scope of this study.

SUMMARY AND IMPLICATIONS

This study has developed a transaction-based model of financial statement misstatements to aid in risk-based planning of audit tests. The model analyzes the risk of misstatements from random error, asset misappropriation, or financial statement manipulation in the specific populations of accounting transactions and account balances that constitute the financial statements. The results of our model identify which transactions should be tested for particular sources of misstatements.

Two broad audit testing objectives are delineated. First, populations of *completed transactions* are tested for the risk of asset misappropriation. Second, populations of *incomplete transactions* are tested jointly for the risk of random error and financial statement manipulation. Insights from the model are then used to consider the overall audit strategy suggested by the audit risk model in SAS 47. Specifically, our analysis helps to clarify the respective roles of control tests versus substantive tests from an audit planning perspective.

It has been seen that our model of errors and irregularities identifies well defined classes of populations for which some form of testing is normally appropriate. This result is summarized in Table 2. The distinctive feature of the model (i.e., incomplete/complete and internal/external transactions) has then proven useful in further classifying the general form of testing (i.e., control/substantive). Table 3 summarizes this analysis.

The study has a number of implications for the potential improvement of audit practice. First, the model of errors and irregularities could be used as a general training tool for understanding inherent risk of misstatements. Second, it might potentially improve audit effectiveness when formally used as a decision aid for audit planning in the design of appropriate (relevant) tests. Third, audit planning based on the study's model might improve audit efficiency because the model demarcates what needs to be tested and, by implication, what need not be tested. Fourth, the model aids in evaluating how testing should be efficiently and effectively undertaken with regard to control tests or substantive tests or a combination of both.

As teachers of auditing we also believe our model of errors and irregularities has positive pedagogical implications for three difficult topics in auditing: the SAS 31 assertions, the SAS 47 audit risk model, and internal control evaluation and SASs 55 and 78. Our experience is that students normally have some problems in understanding the assertions in SAS 31 because of their abstractness and generality. The model of errors and irregularities developed in this study overcomes this pedagogical problem by applying the assertions to context-specific situations and logically relating specific assertions to particular sources of misstatements in specific populations of transactions.

With regard to SAS 47, the basic logic of the audit risk model is easily grasped. However, students struggle to understand the wider implications of the model for audit planning and testing. Our model of errors and irregularities helps by clarifying the strategic role of control tests and substantive tests (and their trade-offs) in testing those populations of accounting transactions and account balances identified in the model.

Internal control evaluation is another difficult aspect of an auditing course. Our model facilitates this by identifying more specifically where internal control reliance matters and should normally be tested (and why). The internal control insights from our model are also consistent with the recommended methodology for auditing internal control (see SAS 55). The essential first step in that process is to identify what misstatements can occur (and why) which is exactly what our model does.

The model of errors and irregularities developed in this study also suggests a number of issues for follow-up evaluation and/or empirical testing. We simply present these in the form of questions. First, can the model be used as an effective pedagogical and training tool for understanding the risk of misstatements and for risk-based audit planning? Second, can the model be operationalized for use in the field as a decision aid for risk-based planning of audit tests and for making strategic choices between control and substantive tests? Third, would the audit testing suggested by the model lead to more efficient auditing (by identifying what should be audited and why)? Fourth, are there currently routine audit tests being performed that are inconsistent with the predictions of our model and which therefore might be unnecessary?

We believe our model of errors and irregularities has a rich potential for the auditing discipline in each of the above areas. The logical and structured understanding it brings to risk analysis, and the role it plays in risk-based preliminary audit planning, are foundational issues that have not been rigorously investigated in the auditing literature. A better understanding of these foundational issues is essential for the further development of risk-based auditing.

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